Surgical management of tuberculous iliopsoas cold abscess

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Surgical management of tuberculous iliopsoas cold abscess

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Written by Moo Sung Kang

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ABSTRACT

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Purpose. Spinal involvement in tuberculosis is unusual and often involves adjacent structures including the iliopsoas muscle. Very few reports have examined the outcomes of medical and surgical management of spinal tuberculosis with extended iliopsoas abscess (IPA). Accordingly, we present our experiences in the management of spinal tuberculosis with extended iliopsoas abscess (IPA).

Methods. We performed a retrospective review of 29 patients, seen between January 2005 and December 2014, who underwent a combination of medical and surgical treatment for spinal tuberculosis complicated by iliopsoas abscess. Clinical presentation, radiographic parameters, treatment modalities, and outcomes were analyzed.

Results. The average age at time of surgery was 35.9±15.1 years and 60% of patients were male. The most common clinical presentation was back pain although three patients also presented with neurological deficits. Twenty out of 29 lumbar IPA patients underwent surgical treatment for drainage, including

90% by anterior approach, 10% by posterior approach,. In combination with surgery, pharmacotherapy was maintained for a mean duration of 14.6 months. All patients recovered without recurrence. There were no complications except wound dehiscence which were occurred in 60% of patients.

Conclusions. Despite recent advances in percutaneous techniques and materials, there is a subgroup of patients for which surgery with proper pharmacotherapy remains the best treatment option. Careful patient selection, a multidisciplinary approach, and standardized surgical techniques can lead to excellent results without serious complications.

Key words : tuberculosis; spine, psoas abscess

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I. INTRODUCTION

Iliopsoas abscess (IPA) is a retroperitoneal collection of pus involving the iliopsoas muscle compartment.[1] IPA was first described by Mynter in 1881 as psoitis.[2] The incidence is rare but diagnosis is increasing with the advent of imaging modalities including computed tomography (CT) and magnetic resonance imaging (MRI). According to the underlying pathogenesis, IPA may be classified into primary and secondary abscesses. Primary IPA can be caused by hematogenous or lymphatic seeding from sites of occult infection owing to the rich vascular supply of the iliopsoas muscle.[3,4] Secondary IPA occurs as a result of the spread of infection from contiguous organs to the psoas muscle. Originating infected structures may include the aorta, gastrointestinal tract, the hip joint, and the vertebral bodies and discs. Spondylodiscitis is the most common cause of secondary IPA, affecting 39.5% of patients.[5] Many studies of spontaneous spinal infections show that *Mycobacterium (M.)*

tuberculosis is the causative pathogen with frequencies ranging from 17 to 39%.[6,7] *M. tuberculosis* is rarely seen in extrapulmonary organs, and occurs in only 1-5% of all TB cases. Tuberculous iliopsoas abscess can be found in more than 55% of cases of musculoskeletal tuberculosis.[8,9] One study reported an incidence rate of cold abscess as high as 98.5%.[10]

Although a variety of surgical interventions including decompression, spinal stabilization with instrumentation, abscess drainage, as well as debridement of infected material have been described; there are few reports on the treatment of tuberculous spondylitis with a large psoas abscess. The purpose of this retrospective review of 20 patients is to present the cases from a single tertiary referral hospital and discuss the relevant literature regarding the management of this disease with the aim of assessing the role of surgical drainage as a management technique.

II. MATERIALS AND METHODS

1. Patients materials

We retrospectively reviewed the medical charts at our institute for the records of all consecutive patients who had been diagnosed with tuberculous spondylitis with psoas abscess during the 10-year period from January 2005 to December 2014. General demographics including age and sex were collected. A comprehensive chart review was performed to determine the presenting signs and symptoms, as well as risk factors, past history of pulmonary or other extrapulmonary tuberculosis (TB) infection. Laboratory findings, radiographic characteristics, microbiologic results, and susceptibility of *M. tuberculosis* strains to anti-tuberculosis medications were also analyzed. Finally, clinical and radiographic outcomes of surgical and pharmacologic treatments were collected and standardized.

2. Operative techniques

Two different surgical approaches were predominantly used. An anterolateral retroperitoneal approach was used for abscesses located at lower lumbar or sacral levels, larger size abscesses extending almost to the anterior abdominal wall, or IPA with concurrent tuberculous spondylitis with instability, for which anterior lumbosacral fusion was indicated. A posterior approach was used for abscesses with posterior extension into the paraspinal muscles, IPA with concurrent epidural abscess with neural compression, or spondylodiscitis with

deformity requiring additional posterior instrumentation.

For the anterolateral retroperitoneal approach, patients were placed in the semi-lateral position at 45°, facing away from the surgeon, following administration of general endotracheal anesthesia. Through a paramedian incision from the border of the rectus abdominis at the level of the umbilicus, the abdominal muscles including the external oblique, internal oblique, and transversus abdominis were exposed. IPAs were usually identified prior to visualization of the psoas muscle due to the large size of abscess. After breaking all of the loculi, removing the abscess wall, and adequately irrigating the cold abscess, a 28 Fr silicon tube was inserted into the abscess pocket. In cases with instability or kyphosis secondary to concurrent TB spondylodiscitis, a suitable autogenic graft was inserted following excision of the necrotic disc.

For the posterior approach, patients were placed in a prone position following administration of general endotracheal anesthesia. Through a midline incision, the posterior spinal elements including the lamina, facet joints, and transverse processes were exposed by subperiosteal dissection extending one or more vertebrae above and below the infected segments. Depending on the degree of neural tissue dysfunction, either total or partial laminectomy was performed to decompress the neural tissue. Concurrent IPA was removed via the intertransverse window. Following drainage of the cold abscess, stabilization with posterior instrumentation and allogenic bone graft was performed.

3. Radiographic analysis

On admission, radiographs were evaluated for pathologic compression fracture and spinal deformities such as kyphosis and scoliosis. Contrast-enhanced CT and MR images were obtained for diagnosis of abscesses and paraspinal inflammatory reaction. Follow-up CT and MR images were used to monitor abscess progression or recurrence and bony changes such as erosion or sclerosis.

IPA size was calculated on axial plane MRI by measuring the dimensions at the widest point. Vertebral body levels were counted on sagittal or coronal plane MRI. Additionally, Gulhane Askeri Tip Akademisi (GATA) grades were used to evaluate the extent of Pott's disease (Table 1). Follow-up imaging included CT with or without contrast or MRI, performed between 3 and 12 months postoperatively to confirm treatment outcome, and serial plain radiographs to further evaluate recovery or progression of spondylodiscitis.

4. Success of treatment

Surgical drainage was considered successful if abscess size was diminished by at least 10 percent of the original diameter on follow-up imaging and laboratory findings confirmed reduced inflammatory reaction. Clinical failure was evaluated based on the need for revisional surgery owing to poor drainage, abscess progression, or recurrence in the ipsilateral surgical field.

Table 1. GATA classification of spinal tuberculosis

Type		Lesion	Treatment
I	A	Lesion located in vertebra, one level disc degeneration, no collapse, no abscess, no neurologic deficits.	Fine needle biopsy and drug therapy
	B	Abscess formation, one or two level disc degeneration , no collapse, no neurologic deficit	Abscess drainage & debridement
II		Vertebral collapse Abscess formation Kyphosis (correctable with anterior surgery) Stable deformity, with or without neurologic deficit, Sagittal index < 20°	1. Anterior debridement & fusion 2. Decompression in cases of neurologic deficit 3. Strut cortical graft is used for fusion
III		Severe vertebral collapse Abscess formation, Severe kyphosis Instable deformity, with or without neurologic deficit Sagittal index >20°	1. Anterior debridement & fusion 2. Debridement 3. Correction of deformity and internal fixation

III. RESULTS

1. Demographic characteristics

A total 73 patients with Pott's disease were identified from hospital records. Among these patients, seven had cervical involvement (7/73, 10% of total patients), 15 had thoracic lesions (15/73, 20%), and 51 had lumbosacral involvement (51/73, 70%). Twenty-nine patients (29/51, 58% of those with lumbosacral involvement) were diagnosed with concurrent psoas abscess and 20 patients (69%) underwent surgical drainage of IPA. The mean age of surgical patients was 35.9 years ± 15.1, ranging from 18 to 62 years, and 60% were male (8 women and 12 men). The mean age of patients undergoing surgical treatment for IPA was significantly lower than those who received nonsurgical treatment (35.9 years versus 52.7 years, respectively, p=0.006)

Thirty percent of patients had one or more risk factors for TB (including history of pulmonary tuberculosis or immunosuppression). Three of those patients reported a history of pulmonary tuberculosis. Concomitant conditions associated with immunosuppressive therapy for a rheumatoid arthritis (n=1) and diabetes mellitus (n=2). Mean body mass index (BMI) was 20.5 ± 2.4 kg/m^2.

The most common presenting symptom in our series was back pain although patients also complained of radiating pain, palpable mass in the abdomen or flank, weight loss, and fever. Three patients who had neurological deficits at presentation were classified ASIA D on the American Spinal Injury Association (ASIA) Impairment Scale. Tables 2 and 3 summarize the clinical presentation

of those with spinal involvement.

Table 2. Spinal involvement (n=73)

Involvement	Patients (percentage of total)
Cervical	7 (10%)
Thoracic	15(20%)
Lumbosacral	51 (70%)
Iliopsoas abscess (IPA)	29 (59%)
Surgical drainage for IPA	20 (39%)
Percutaneous drainage for IPA	1 (2%)

Table 3. Initial complaints (n=20)

Complaints	Patients (percentage of total)
Back pain	20 (100%)
Radiating pain	12 (60%)
Palpable mass in the abdomen or flank	4 (20%)
Motor loss	3 (15%)
Sensory dysfunction	2 (10%)
Weight loss	1 (5%)

2. Patterns and locations of spinal tuberculosis

Sixty percent of patients (n=12) had bilateral IPAs and 30% of patients (n=6) had concurrent spinal epidural abscesses. All patients had skeletal TB and in 18 out of 20 patients (90%) bony infiltration was diagnosed as spondylodiscitis while the remaining 2 out of 20 (10%) had sacroiliac joint infiltrations. Seven patients (35%) exhibited segmental kyphosis and four (20%) had pathologic compression fractures. According to the GATA classification system, nine patients (45%) presented with grade IB, nine (45%) with grade II, and two (10%) with grade III.

IPA and Pott's disease was found as high as T12 and as low as S3 with mean involvement of 4.3 vertebral bodies, ranging from at least 2 up to 7 vertebral bodies (2 levels in two patients, 3 levels in six patients, 4 levels in four patients, 5 levels in four patients, and more than 6 levels in five patients). The mean diameter of the psoas abscess in patients undergoing surgical drainage was 68 mm (range, 37-114 mm), while eight patients who received only conservative care had psoas abscesses with a mean diameter of 36 mm (range, 19-49 mm).

3. Laboratory findings

The erythrocyte sedimentation rate (ESR) was measured at the initial admission in all patients and uniformly elevated with mean value 64.8 mm/hr (range, 24-118 mm/hr) and C-reactive protein (CRP) was also measured and elevation was reported in eighteen of 20 patients (86%). The mean value of

elevated CRP was 52.4 mg/L (range, 12-116 mg/L). After initiation of either surgical or medical treatment ESR decreased into the normal range within mean duration of 5.0 months and with regard to CRP, normalization took mean duration of 3.5 months. Seven of 20 patients (35%) in ESR and one case (5%) in CRP did not decrease into normal range with minimal follow-up 14 months.

Wound culture revealed 30% of sensitivity (3 positives in 10 specimens) and mean duration for report of culture were 2.5 weeks in liquefied medium and 4.7 weeks in solid medium. Sensitivity of polymerase chain reaction (PCR) of surgical specimen was reported as high as 100% (3 positives in 3 specimens). Additional studies of sputum including smear of sputum and cultures revealed as high as 16.6% (2 positives in 12 specimens) and 33.3% (2 positives in 6 specimens) respectively. Pathologic exam reported pathognomic caseous necorosis in 71.4% of sensitivity (5 positives in 7 specimens). There was no superinfetion with polymicrobial pathogen other than M. tuberculosis

4. Surgical treatment

Twenty patients underwent medical management including surgery. Primary surgical drainage was selected for five patients owing to large abscess size and for another five patients secondary to pathologic compression fracture or segmental instability on initial imaging studies. The other ten patients (50%) had surgery because of enlargement of the abscess or progression of segmental kyphosis after 3-months of conservative medical treatment.

Twelve of 20 patients (60%) underwent abscess drainage with or without neural decompression and eight (40%) underwent abscess drainage with concurrent single-stage fusion via either anterior or posterior approach. Drainage of IPA was predominantly accomplished by anterolateral retroperitoneal approach (90%, n=18) although two patients underwent a posterior approach (10%, n=2). Mean blood loss during spinal fusion procedures was 783 mL while blood loss from surgery without fusion was 159 mL. Drainage catheters were placed into the IPA for a mean duration of 8.2 days (range, 2-29 days) and mean drainage volume was 496 mL (range, 60-3870 mL). Autologous iliac bone grafts were used in all spinal fusion surgeries.

Mean follow-up duration was 76.5 months (range, 13-118 months). All patients recovered from IPA after drainage. Additionally, spinal fusion procedures for concurrent instability were successful. The clinical success rate was 100%. Mean duration to resolution of IPA in follow-up imaging studies was 8.9 months (range, 3-25 months). However, one patient was diagnosed with tuberculous empyema at 17 months postoperatively. Table 4 summarizes the surgical interventions.

There were no complications related to surgical intervention such as worsening of spinal cord or nerve root injury. However, wound dehiscence and fistula formation at the tube insertion site was detected in twelve patients. The ten patients with wound dehiscence had undergone surgery by anterolateral

approach and the remaining two patients with fistula formation had undergone a posterior approach. All cases of wound dehiscence and discharge recovered with conservative management. Mean duration of recovery for wound dehiscence or fistula formation was 6.5 months postoperatively (range 2-14 months).

Table 4. Total surgical procedure performed for drainage of abscess (n = 20)

	Surgical drainage		Patients (percentage of total)
Anterolateral approach	Decompression & drainage		9 (45%)
	Fusion & drainage		9 (45%)
		ALIF	5 (25%)
		Combined posterior fusion	4 (20%)
Posterior approach	Decompression & drainage		1 (5%)
	Fusion & drainage		1 (5%)

ALIF = Anterior lumbar interbody fusion

5. Anti-tuberculosis medication

All patients were treated with quadruple regimens, equivalent to those used for pulmonary tuberculosis, including isoniazid (INH) 5 mg/kg/d, rifampicin (RFP) 10 mg/kg/d, ethambutol (EMB) 15 mg/kg/d, and pyrazinamide (PYZ) 35 mg/kg/d. Two patients (10%) exhibited resistance to the empirical regimen (n=2, one was reported to have resistance to INH and the other had resistance to INH, RFP, and EMB) and a second-line regimen for TB including levofloxacin and kanamycin were administered. One patient developed optic neuritis as a complication from EMB and another exhibited hepatotoxicity and a drug eruption resulting in transition to the second-line regimen. The duration of therapy varied from 6 months to 24 months. The mean duration was 14.6 months for all patients although the two patients with resistance to the first-line regimen were treated for a period ranging from 18 to 24 months.

IV. DISCUSSION

Despite decades of global efforts to control the TB epidemic, the global prevalence of TB has been increasing and has been reported to be as high as 159 per 100,000 in recent years. Nine million people worldwide received treatment for TB in 2013.[11] In addition to indolent clinical course, marked increase in HIV infection, and the emergence of drug-resistant *M. tuberculosis* have both contributed to a high rate of failure in the treatment of TB and it is a serious public health issue in both developing countries where TB is endemic, as well as industrialized countries.

Tuberculous spondylitis most commonly affects the lower thoracic and upper lumbar spine and IPA accompanies Pott's disease in more than 70% of cases, often in association with extradural extension.[4,12] Sacroiliac joint involvement is relatively rare and has been reported in up to 10% of patients with skeletal tuberculosis. In our institute, similar patterns were observed. Of the patients with tuberculous spondylitis, 70% presented with disease in the lumbosacral spine and 58% of those with lumbosacral involvement also presented with psoas abscess. Only 7% of patients had SI joint infiltration in our study. The disease usually involves more than two vertebrae and in our study, a mean of 2.6 vertebral segments were involved.

Furthermore, tuberculous spondylitis usually affects the anterior aspect of the intervertebral joints which ultimately results in collapse of the vertebra secondary to decreased vascular supply.[8] Pathogens can then spread

simultaneously through the eroded bony cortex to the anterior ligament and the adjacent vertebral body, as well as directly into the iliopsoas muscle. Psoas abscess is also commonly accompanied by concurrent epidural abscess formation.[13,14]

The clinical presentation of tuberculous IPA is nonspecific and slow to progress. The most common symptom is local back pain that increases gradually for several weeks to months. Neurologic impairment often results from neural compression, which can occur in cases with kyphosis or epidural abscess, and is decreasing currently due to improvements in the accessibility of medical care. Constitutional symptoms from tuberculous infection such as fever or weight loss are found more frequently with infiltration of other organs and are unusual.[14,15] In our study, 20 out of 29 lumbar IPA patients with psoas abscess required surgical intervention because of failed conservative management, large abscess volume on initial imaging studies, or concurrent segmental instability. Patients requiring surgical drainage of IPA were significantly younger than those who were managed nonsurgically (35.9 versus 52.7 years, respectively, p=0.006). It is presumed that the stronger immune reaction of younger patients may lead to the development of a greater volume of pus. The high pressure created by this volume of pus penetrates the weakened periosteum more easily and forms IPA.

Plain radiographs, CT, MR imaging, and radionuclide scans can be used in the diagnosis of IPA and for follow-up observation.[16] Plain radiograph is first step

in evaluation and has specific advantages in identifying deformation of spinal alignment or segmental instability. Likewise, CT is excellent for both diagnosis and serial monitoring of treatment outcomes in patients with IPA. However, MR imaging with contrast enhancement is now the standard modality for diagnosis and follow-up of spondylodiscitis in patients with extradural or intradural infections and neurologic manifestations.

Positive tissue culture and histologic examination can be definitive evidence of tuberculous abscess. Drug susceptibility testing of specimens is also essential in determining the appropriate regimen. However, cultures for *M. tuberculosis* can take at least 2 to 8 weeks for colonization and are reported positive in only 50-60% of patients.[17] In some cases, cultures may demonstrate colonizing bacteria and fungi which lead to an erroneous determination of causative pathogen. Even in circumstances suspicious for musculoskeletal tuberculosis, antibiotic treatment is often delayed due to radiographic and microbiologic ambiguity between pyogenic infection and tuberculous lesion as well as false-negative biopsy results.[18]

Despite many studies over the decades, treatment recommendations for tuberculous IPA are not established throughout the world. Some authors claim that patients with small tuberculous IPA can usually be treated with antituberculous medication alone, and in patients with intact immune systems and lesions limited to one or two vertebrae, surgery should be reserved for cases that fail to improve after 3 months of pharmacologic treatment.[19,20,21] However,

some believe that cold abscess can be an infective foci and function as a risk factor for relapse. As such, they advocate that drainage and prompt initiation of antimicrobials be considered at the initial stage of management.

At present, a few reports have described successful drainage of tuberculous IPA by percutaneous intervention under the guidance of imaging modalities such as ultrasound (US) or CT. Gupta et al. evaluated 27 patients with iliopsoas abscesses of tuberculous origin and reported an initial success rate of 100% and a 29.6% rate of relapse. Dinc et al. described the same results based on their study of 29 patients. Similarly, Pombo et al. also reported 100% success followed by a 14% relapse rate in his experiences with 7 patients. Successful percutaneous drainage for tuberculous IPA can be achieved easily, although recurrence was reported.[21-25]

Surgical intervention has advantages and disadvantages. First, the major disadvantage is the extensive incision and soft tissue dissection that are necessitated by a deep operative field. Second, general anesthesia is required, and finally, risk of critical injury to peri-lesional tissue, including neural tissue, bowel, peritoneum, or major abdominal vessels exists. These factors can contribute to greater operative risk, increase morbidity, and complicate the attainment of surgical purpose.

Nevertheless, surgical drainage has other advantages in the treatment of tuberculous IPA. A surgical approach can provide not only drainage of pus but also more substantial debridement of the IPA including thickened walls. Prior

studies highlight the importance of complete debridement in lowering the recurrence rate.[26,27] Several authors reported no recurrence of tuberculous IPA after various surgical methods including a one-stage posterior approach, anterolateral retroperitoneal approach, and even a minimally invasive retroperitoneoscopic approach.[8,26,28] In the present study, similar to prior studies, most patients underwent an anterolateral approach and no recurrence was reported at a mean follow-up period of 76.5 months.

The slow progression pattern of TB obscures clinical symptoms and usually results in spinal tuberculosis with relatively large IPA at diagnosis. Mean diameter for surgical candidates was 68 mm in our study and the abscess had grown to be superficial to the skin. The advantages of an anterolateral approach are the simplicity and effectiveness in achieving complete drainage and debridement with only a small incision. In cases with multiloculated lesions or thick walled abscesses, surgical instruments can easily pass through the multiple layers or thick walls of the abscess.

Lastly, considering the pathological mechanism of tuberculous IPA, it is unusual to find IPA without bony destruction or segmental kyphosis. Surgical treatment is warranted for patients with tuberculous spinal disease under the following circumstances: advanced neurological deficits, worsening neurological deficits while on pharmacologic therapy, obvious kyphosis measuring >40 degrees at the time of presentation, complicated abscess formation, and instability resulting from discitis.[29] In a study which suggests a

new GATA classification for tuberculous spondylodiscitis, Oguz et al. reported that many patients with tuberculous spondylodiscitis have evidence of disease progression at initial presentation which are classified at GATA grade II or III. They found that the ratio of patients with spinal tuberculosis classified at GATA grade II or III, including segmental kyphosis or instability, was 85%.[30] The combined or anterior approach for spinal tuberculosis with instability is accepted by most surgeons and allows direct access to the infected focus as well as convenience for both reconstructing the vertebrae and debriding the IPA. There are a variety of treatment options including simple abscess drainage, anterior grafting with or without instrumentation, posterior grafting with instrumentation, and a combined anterior and posterior approach.[31, 32]

In this study, the choice of approach was based on the location of the abscess and the presence of concurrent epidural abscess or deformity. Although the anterior approach creates a risk of injury to the peritoneum, bowel, or major abdominal vessels, in large abscesses, the approach is simple and relatively safe due to the superficial location of abscess. The posterior approach is particular useful when concurrent circumferential spinal exposure is needed, but can be impractical because resection of the transverse process is sometimes necessary to approach the IPA or special equipment including ultrasound is required to target the IPA properly. The proper surgical method to use has not been exactly established. Therefore, it is recommended that the surgeon tailor each operation to the specific considerations of the patient.

The literature supports the use of the same antituberculous therapy for spinal tuberculosis as used for pulmonary tuberculosis. The suggested optimal pharmacotherapy program is six to nine months for most patients with first-line regimens.[33] Longer programs, which range from 9 to 12 months, are recommended for patients who do not take rifampin or patients with far-progressed disease.[34] There is still controversy regarding choice of the optimal regimen for patients with drug-resistant *M. tuberculosis*.[35] Patients in this study received antituberculosis treatment for a mean duration of 14.9 months (range, 6-27 months) and one continued medical treatment for another 12 months beyond recovery from IPA and spinal tuberculosis due to a tuberculous empyema in the chest cavity.

For patients in this study, treatment resulted in control of the infection and recovery of spinal stability without any instrumentation failure. There were no major complications such as transient neurological worsening or injury to the major abdominal vasculature. Surgical site dehiscence, with discharge from the incision site or from the insertion site of the drainage catheter, was more common than in previous reports. However all patients with late dehiscence were treated by simple dressing in an outpatient clinic and recovered completely over several months.

Limitations inherent to this study include the retrospective study design and relatively small number of patients. Due to the low incidence of spinal tuberculosis with IPA, it is difficult to implement a prospective study based on a

large number of patients.

V. CONCLUSIONS

Despite recent advances in techniques and materials for percutaneous drainage, surgical debridement and drainage of IPA as described above is a relatively simple operation with low recurrence rates and negligible morbidity. Careful patient selection, a multidisciplinary approach, and standardized surgical techniques can lead to favorable control of IPA with virtually no serious complications

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ABSTRACT(IN KOREAN)

장요근 농양이 동반된 척추 결핵의 치료

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결핵의 척추 침범은 그 빈도가 높지 않으며 발생시 흔히 장요근 등의 주변 조직을 같이 침범하는 경우들이 많다. 장요근 농양이 동반된 척추 결핵의 내과적, 외과적 처치의 결과는 그 보고들이 아직 몇몇에 불과하다. 이 연구에서는 본 기관에서의 장요근 농양이 동반된 척추 결핵의 치료 경험을 보고하고자 한다.

이 연구는 2005년부터 2014년까지 본원에서 외과적으로 배농한 29명의 환자를 후향적으로 분석하였으며 임상 양상과 방사선학적인 분석, 수술적 치료의 종류 및 결과를 정리하였다.

환자들의 평균 연령은 35.9세였으며 60%는 남성에서 발병하였다. 가장 흔한 증상은 병변부 주변의 요통이었으며 5명에서만 신경학적 결손을 동반하였다. 20건의 수술 중 전방 접근하 수술이 90%, 후방 접근이 10%에 해당하였다. 평균 추적 관찰 기간은 76.5개월이었으며 모든 환자에서 수술적 치료로 농양의 호전을 보였으며 재발은 없었다. 60% 환자에서 창상 열개로 보존적 치료를 받았으나 그 외 중한 합병증은 발생하지 않았다.

장요근 농양의 치료에 경피적 접근 방법들이 발전하고는 있지만 결핵성 척추염에서 병발한 장요근 농양의 경우에는 아직까지 수술적 치료가 가장 적합한 치료인 경우들이 존재한다. 따라서 신중한 환자 선택 및 다학제 접근을 통한 수술적 치료르 통해 심각한 합병증 없이 훌륭한 임상 결과를 얻을 수 있겠다.

핵심되는 말 : 결핵, 척추, 요근 농양